Calendar No. 205

106th Congress 1st Session	SENATE	REPORT 106–106

FEDERAL RESEARCH INVESTMENT ACT

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

on

S. 296

JULY 12, 1999.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

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Mr. MCCAIN, from the Committee on Commerce, Science, and Transportation, submitted the following

REPORT

[To accompany S. 296]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 296) "A bill to provide for continuation of the Federal research investment in a fiscally sustainable way, and for other purposes", having considered the same, reports favorably thereon with an amendments and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of the bill, as reported, is to provide for the continuation of the Federal research investment in a fiscally sustainable way.

BACKGROUND AND NEEDS

Technical innovation is a driving force behind the Nation's long-term economic growth and rising standards of living. Federal investments in research and development (R&D) have resulted in enormous financial and employment growth of the private and public sectors. Studies show that 50% of all post- World War II economic growth is a direct result of technological innovation.

Contrary to popular belief, the R&D enterprise in the United States receives nearly two-thirds (65 percent) of its funding from private industry. The Federal government supports much of the balance, with the remainder comprised of funding from colleges and universities, other non-profit institutions, and state and local governments. The role of the Federal government is particularly pivotal in funding basic research, supporting nearly 60 percent of the national budget for such research at both public and private institutions. A comparable portion of the applied research performed

in U.S. colleges and universities also is funded Federally. Because private sector R&D investments are stimulated principally by individual company interests, the Federal government's impact on national R&D priorities is profound, particularly in areas such as health, space, and national defense.

Since the 1960's, trends in R&D funding have paralleled those of overall discretionary spending. Thus, Federal investment in R&D has expanded by slow, steady growth. However, increasing mandatory spending levels have begun to constrain discretionary spending, and to decrease fiscal flexibility for those programs. As the discretionary portion of the budget declines and spending caps continue to be imposed, R&D programs will compete increasingly with funding for public infrastructure, housing, social services, education, transportation, and military operations. While Federal R&D funding has increased in constant dollars from a peak in 1968, outlays have decreased from about 11 percent of the total budget in 1966, during the buildup for the space program, to less than 3 percent today. As a proportion of discretionary spending, outlays have decreased from 16 percent in 1966 to about 13 percent today. Budget trends continue to demonstrate preferences for selective increases in the funding of the National Institutes of Health (NIH) and the National Science Foundation (NSF), with constant dollar decreases in many other areas.

The Administration's fiscal year (FY) 2000 R&D budget request is $78 billion. Approximately 51 percent of that request is designated for civilian programs, with health consuming the largest portion and defense programs receiving about 41 percent. As indicated above, these proposed R&D expenditures represent 4.3 percent of the total budget and 13 percent of the discretionary allocation. The FY 2000 request represents a 1.7 percent overall decrease from FY 1999 and includes a 3.6 percent increase for civilian R&D. The request reflects the Administration's priorities in health, energy, commerce, and general science, proposing a 6.5 percent increase for NSF, an 8.3 percent increase for non-defense R&D within the Department of Energy (DOE), and a 2.1 percent increase for NIH. The proposed budget seeks increases of 0.6 percent for the National Aeronautics and Space Administration (NASA) and 38.7 percent for the Department of Transportation (DOT). The Environmental Protection Agency (EPA) would decrease by 3.5 percent and the National Oceanic and Atmospheric Administration would remain the same.

While funding levels are one important consideration for Federal R&D programs, another issue is improving the effectiveness of such programs. On August 3, 1993, the Government Performance and Results Act (GPRA) was signed into law. GPRA requires that all Federal agencies move toward performance budgeting by the year 2001. The President submitted a government-wide performance plan with the FY 2000 budget, and individual agencies are submitting performance plans to Congress during the FY 2000 authorization and appropriations cycle. The General Accounting Office reports that research agencies have encountered difficulties in preparing strategic plans and in developing performance measures.

LEGISLATIVE HISTORY

On April 16, 1997, April 28, 1998, and April 15, 1999, the Subcommittee on Science, Technology, and Space conducted hearings on Federal R&D funding. Witnesses included: Dr. Neal Lane, Advisor to the President, Office of Science and Technology Policy; Senators Phil Gramm, Joseph Lieberman, and Jeff Bingaman; Dr. Kerri-Ann Jones, Acting Director, Office of Science and Technology Policy; Dr. Judith Rodin, President of the University of Pennsylvania; Dr. Albert Teich, Director of Science and Policy Programs, American Association for the Advancement of Science; and Mr. Dan Peterson, President, DAP & Associates. On October 8, 1998, S. 2217, the Federal Research Investment Act of 1998 passed the Senate with an amendment by unanimous consent. S. 296 is the successor to S. 2217.

On January 22, 1999, Senators Bill Frist and Jay Rockefeller, Chairman and Member of the Commerce Committee's Subcommittee on Science, Technology, and Space, introduced S. 296, the Federal Research Investment Act. The bill is cosponsored by Senators Domenici, Lieberman, Gramm, Bingaman, Burns, Breaux, Moynihan, Cleland, Kerry, Kerrey, Allard, Abraham, Boxer, DeWine, Snowe, Feinstein, Hutchison, Durbin, Dodd, Cochran, Landrieu, Ashcroft, Thompson, Akaka, Robb, Crapo, Sarbanes, Lott, Murray, Roberts, Levin, Santorum, Kennedy, Conrad, and Daschle.

On May 5, 1999, the Committee met in open executive session and, by a voice vote, ordered S. 296 to be reported with an amendment. The amendment incorporates several suggested changes to the bill, makes a number of technical corrections, and provides an exclusion clause for any agencies covered by the Act that accelerate at a rate above 8 percent. Such an agency would be removed from the base calculation until the growth in its R&D budget dipped below an annualized goal of 5.5 percent, the aggregate annual authorization target for the Act.

SUMMARY OF MAJOR PROVISIONS

Authorization of appropriations. S. 296, as reported, authorizes appropriations for the R&D programs of the following Federal departments and agencies: the Food and Drug Administration (FDA); NIH; NSF; the National Institute of Standards and Technology (NIST); NASA; NOAA; the Centers for Disease Control (CDC); DOE; DOT; the Smithsonian Institution; EPA; the United States Department of Agriculture (USDA); the United States Department of Education (USDE); the Department of the Interior (DOI); and the Department of Veteran Affairs (VA). A total of $39.8 billion is authorized to be appropriated in FY 2000, increasing to almost $70 billion in FY 2010. The bill states that the increases called for are not intended to exceed discretionary budget caps.

National R&D findings, principles, and policy. S. 296, as reported, outlines key findings regarding the value, impact, and status of R&D in the United States and the link between the research process and useful technology. Four major topics are identified: (1) the flow of science, engineering, and technology; (2) excellence in the American research infrastructure; (3) commitment to a broad

range of research initiatives; and (4) partnerships among industry, universities, and Federal laboratories. The bill also establishes principles for maintaining the Federal research effort, including ensuring good peer-reviewed science, demanding fiscal accountability, funding programs with measurable results, and selecting programs that adhere to established national priorities. In addition, S. 296 establishes as a national policy the importance of Federal investments in research and technology development to the economy and the American standard of living.

Annual budget report. S. 296, as reported, requires the President to submit, in coordination with his annual budget request, a report detailing the Federal R&D commitment. The report would include a focused strategy for meeting Congressional funding targets for civilian R&D and an analysis of the Administration's funding methodology.

Accountability for R&D programs. As reported, the bill requires the Office of Science and Technology Policy (OSTP), in consultation with the Office of Management and Budget (OMB), to enter into a contract with the National Academy of Sciences (NAS) to complete a study containing recommendations for criteria to evaluate Federal R&D programs. In addition, S. 296 amends GPRA to require that such criteria be used to set performance goals under that law and establishes a process to ensure that R&D programs meet those goals. If programs do not meet the goals, they must be brought into compliance, or may be terminated if such compliance efforts fail.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

[Insert CBO letter, attached as pages 4A through 4E]

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

The Committee believes that the bill will not subject any individuals or businesses affected by the legislation to any additional regulation.

ECONOMIC IMPACT

This legislation will not have an adverse economic impact on the Nation. It authorizes funding to ensure sustained levels of Federally-funded scientific, medical and pre-competitive engineering research over an 11-year period. In addition, the bill requires the OMB Director to submit an annual report to Congress outlining Federally-funded program activities which do not meet acceptable

GPRA criteria. This action will provide oversight of agency programs and promote more cost-effective use of Federal funds.

PRIVACY

This legislation will not have a negative impact on the personal privacy of individuals.

PAPERWORK

This legislation will not increase the paperwork requirement for private individuals or businesses. It contains four Federal reporting requirements: (1) the President is to include in his annual budget request to Congress a report detailing the total level of funding for R&D programs throughout all civilian agencies, and outlining the Administration's strategy for meeting Congressional funding targets through 2010; (2) the OSTP Director, in consultation with the OMB Director, is to contract with NAS for a comprehensive study to be submitted to OMB and the Congress on methods for evaluating Federally-funded R&D programs; (3) the OMB Director is to identify the civilian R&D program activities which do not meet the criteria defined in GPRA in an annual report to the President and to Congress; and (4) the head of an agency whose program activities do not meet the GPRA criteria for two years is to submit to Congress a strategic plan for bringing the program into compliance or terminating it, including any necessary legislative changes.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title and table of contents

This section cites the short title of the reported bill as the "Federal Research Investment Act."

Section 2. General findings regarding Federal investment in research

This section of the reported bill outlines key findings regarding the value of R&D to the United States and the status of the Federal R&D investment. The findings state that current projections for Federal research funding show a downward trend. This trend reflects the confluence of increased national dependency on technology, increased targets of opportunity, and decreased flexibility in apportioning dwindling discretionary funds. Indicators show that more funding for science, engineering, and technology is needed, but, even with increased funding, priorities must be established among different programs.

Section 3. Special findings regarding health-related research

This section of the reported bill emphasizes specific observations regarding the economic benefits of health-related research. It recognizes the current Congressional support for increased funding in the near term and stresses potential difficulty in fully achieving this investment in health research if other fields of science and engineering are not properly preserved.

Section 4. Additional findings regarding the link between the research process and useful technology

This section of the reported bill highlights four major observations: (1) the current flow of science, engineering, and technology from early stages of research through pre-commercialization should

be less discrete and better coordinated; (2) the relationship between Federal research and education should be expanded to include geographically-diverse states, primary and secondary educational institutions, and the community college system; (3) the United States should encourage research opportunities for interdisciplinary projects that foster collaboration among fields of research; and (4) partnerships among industry, universities, and Federal laboratories should be optimized.

Section 5. Maintenance of Federal research effort; guiding principles

This section of the reported bill outlines four guiding principles for maintenance of Federal research efforts. First, Federal programs must be focused, peer-reviewed, merit-based, and not unnecessarily duplicative. They must address both knowledge-driven and mission-driven scientific requirements. The second principle guiding the maintenance of Federal research efforts requires programs to be fiscally accountable. Congress must exercise oversight to ensure that programs funded with scarce Federal dollars are properly managed. Third, government programs must have measurable results, and the effectiveness of these programs in achieving their goals must be evaluated. Fourth, selection of programs for Federal funding must balance the Nation's two traditional priorities: (1) basic scientific and technological research that represents an investment in the Nation's long-term scientific and technological capacity; and (2) mission-related research that derives from necessary public functions such as defense, health, education, and environmental protection. Because government investments should not compete nor displace short-term, market-driven private-sector funding, they should be restricted to pre-competitive activities rather than commercial technologies.

Section 6. Policy statement

Subsection (a) of this section states the overall goal of the bill to assure a base level of Federal funding for basic, scientific, biomedical, and precompetitive engineering research, with this base level defined as a doubling of Federal basic research funding over the 11-year period following the date of enactment of this Act.

Subsection (b) identifies the agencies covered by the authorizations in the bill as: NIH, NSF, NIST, NASA, NOAA, CDC, DOE, DOT, the Smithsonian Institution, EPA, USDA, USDE, DOI, FDA, and VA. The Committee intends that the programs of these agencies be covered only to the extent that such programs involve activities that support basic scientific, medical, or pre-competitive engineering research.

Subsection (c) discusses historic investment trends and potential damage to the U.S. research infrastructure from continued inadequate funding levels.

Subsection (d) authorizes the following aggregate appropriation levels for civilian R&D for FY 2000 through FY 2010:

- $39.79 billion for FY 2000;
- $41.98 billion for FY 2001;
- $44.29 billion for FY 2002;
- $46.72 billion for FY 2003;
- $49.29 billion for FY 2004;
- $52.00 billion for FY 2005;

- $54.87 billion for FY 2006;
- $57.88 billion for FY 2007;
- $61.07 billion for FY 2008;
- $64.42 billion for FY 2009; and
- $67.97 billion for FY 2010.

Subsection (d) creates an exclusionary clause whereby any agency included in this Act under subsection (b) which increases its R&D funding by more than 8 percent over the amount appropriated for its R&D in the preceding fiscal year shall be removed from the total fiscal year authorization in subsection (d) until that agency's annualized appropriation meets or falls below the aggregate 5.5 percent target for increased funding under the Act.

Subsection (e) requires that no funds be made available under the bill in a manner that does not conform with the discretionary spending caps provided in the most recently adopted concurrent resolution on the budget.

Subsection (f) calls for the aggregate funding levels authorized by section 5 to be balanced among various scientific and engineering disciplines and geographically dispersed throughout the states.

Section 7. President's annual budget request

This section of the reported bill requires the President, as part of the annual budget request process, to submit a report on implementation of the commitment to support Federally-funded R&D. The report must provide: (1) a detailed summary of the total level of funding for R&D programs throughout civilian agencies; (2) a focused strategy reflecting annual funding projections for R&D through FY 2010; (3) an analysis of funding levels across Federal agencies by methodology of funding, including grant agreements, procurement contracts, and cooperative agreements; and (4) specific proposals to improve R&D infrastructure and capacity in States with less concentrated R&D resources in order to create a nationwide R&D community.

Section 8. Comprehensive accountability study for Federally-funded research

Subsection (a) of this section of the reported bill requires the Director of OSTP, in consultation with the Director of OMB, to contract with NAS for a comprehensive study. The goal of the study is to develop methods for evaluating Federally-funded R&D programs by: (1) describing the research process in various scientific and engineering disciplines; (2) examining the measures and criteria employed by each discipline to evaluate the success or failure of a program both for exploratory long-range work and short-term goals; and (3) recommending how these measures may be adapted for use by Federally-funded R&D programs.

This subsection also calls for the study to assess the extent to which agencies incorporate independent merit-based review into the formulation of strategic plans, as well as the quantity and quality of this type of input. NAS would evaluate mechanisms for identifying poorly performing programs and the extent to which an independent merit-based review would contribute to addressing those problems. In addition, NAS is required to report on the validity of using quantitative performance goals for administrative aspects of a program including: paperwork requirements for contractors, grant recipients and external reviewers; cost and schedule

controls for any associated construction projects; the ratio of overhead costs relative to other program costs; and responsiveness to requests for funding, participation, or equipment use. Finally, the study would examine the extent to which Federal funding decisions support the Nation's historical R&D priorities.

Subsection (b) of this section provides for integration of the results of the NAS study into GPRA requirements. Within six months of study completion, the Director of OMB is required to promulgate one or more alternative forms for performance goals under GPRA (31 U.S.C. 1115(b)(10)(B)) based upon the study recommendations. In the development of such alternatives the OMB Director is required to provide for public notice and comment, obtain the approval of the Director of OSTP, and consult with the National Science and Technology Council. The goal of this subsection is to offer the head of each agency that conducts R&D activities alternative and more appropriate mechanisms to successfully comply with GPRA.

Subsection (c) of this section requires each agency that carries out R&D activities, upon updating or revising their strategic plan under subsection 306(b) of title 5, United States Code, to describe its current and future use of the alternative performance goals consistent with the NAS study. Subsection (d) provides definitions for several terms used in this section of the reported bill, including "Director," "program activity," and "independent merit-based evaluation." Finally, subsection (e) authorizes appropriations of $600,000 for carrying out the NAS study.

Section 9. Effective performance assessment program for Federally-funded research

Section 9(a) of the reported bill amends GPRA to add a new section 1120 dealing with accountability for R&D programs. Subsection (a) of new section 1120 of GPRA requires the Director of OMB, based upon annual performance reports submitted by the President to Congress under GPRA, to identify civilian R&D program activities or components of such activities that do not meet an acceptable level of success as defined by alternative performance goals developed under section 8 of the reported bill. The OMB Director is required to submit a report to the President and Congress that lists program activities or components identified under this subsection within 30 days after each agency submits its annual GPRA report to the President.

Subsection (b) of new section 1120 of GPRA establishes a process for addressing programs that have failed to meet performance goals. When a program is identified as being below acceptable success levels in two consecutive OMB reports, the head of the responsible agency is required to submit a statement to the Congressional committees of jurisdiction outlining steps that will be taken to (1) bring the program into compliance with applicable performance goals; or (2) to terminate the program if compliance efforts have failed. A submission under this subsection also is required to identify any legislative changes needed for its implementation or termination. In establishing the process under this subsection, the Committee intends to improve accountability for R&D spending and to encourage cost-efficiencies in Federally-funded R&D programs. However, this process should not be used to impose substantial new paperwork burdens on R&D programs that are not required of

other Federal programs. Nor does the Committee intend that the process be used to target Federal R&D programs for which the funding reflects Congressional rather than Administration priorities.

Section 9(b) of the reported bill makes two technical and conforming amendments to GPRA.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

TITLE 31. MONEY AND FINANCE

SUBTITLE II. THE BUDGET PROCESS

CHAPTER 11. THE BUDGET AND FISCAL, BUDGET, AND PROGRAM INFORMATION

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§ . 1115. Performance plans

(a) In carrying out the provisions of section 1105(a)(29), the Director of the Office of Management and Budget shall require each agency to prepare an annual performance plan covering each program activity set forth in the budget of such agency. Such plan shall—

(1) establish performance goals to define the level of performance to be achieved by a program activity;

(2) express such goals in an objective, quantifiable, and measurable form unless authorized to be in an alternative form under subsection (b);

(3) briefly describe the operational processes, skills and technology, and the human, capital, information, or other resources required to meet the performance goals;

(4) establish performance indicators to be used in measuring or assessing the relevant outputs, service levels, and outcomes of each program activity;

(5) provide a basis for comparing actual program results with the established performance goals; and

(6) describe the means to be used to verify and validate measured values.

(b) If an agency, in consultation with the Director of the Office of Management and Budget, determines that it is not feasible to express the performance goals for a particular program activity in an objective, quantifiable, and measurable form, the Director of the Office of Management and Budget may authorize an alternative form. Such alternative form shall—

(1) include separate descriptive statements of—

(A)(i) a minimally effective program, and

(ii) a successful program, or

(B) such alternative as authorized by the Director of the Office of Management and Budget,

with sufficient precision and in such terms that would allow for an accurate, independent determination of whether the program activity's performance meets the criteria of the description; or

(2) state why it is infeasible or impractical to express a performance goal in any form for the program activity.

(c) For the purpose of complying with this section, an agency may aggregate, disaggregate, or consolidate program activities, except that any aggregation or consolidation may not omit or minimize the significance of any program activity constituting a major function or operation for the agency.

(d) An agency may submit with its annual performance plan an appendix covering any portion of the plan that—

(1) is specifically authorized under criteria established by an Executive order to be kept secret in the interest of national defense or foreign policy; and

(2) is properly classified pursuant to such Executive order.

(e) The functions and activities of this section shall be considered to be inherently Governmental functions. The drafting of performance plans under this section shall be performed only by Federal employees.

(f) For purposes of this section and sections 1116 [through 1119,] *through 1120* and sections 9703 and 9704 the term—

(1) "agency" has the same meaning as such term is defined under section 306(f) of title 5;

(2) "outcome measure" means an assessment of the results of a program activity compared to its intended purpose;

(3) "output measure" means the tabulation, calculation, or recording of activity or effort and can be expressed in a quantitative or qualitative manner;

(4) "performance goal" means a target level of performance expressed as a tangible, measurable objective, against which actual achievement can be compared, including a goal expressed as a quantitative standard, value, or rate;

(5) "performance indicator" means a particular value or characteristic used to measure output or outcome;

(6) "program activity" means a specific activity or project as listed in the program and financing schedules of the annual budget of the United States Government; and

(7) "program evaluation" means an assessment, through objective measurement and systematic analysis, of the manner and extent to which Federal programs achieve intended objectives.

* * * * * * *

§ 1120. Accountability for research and development programs

(a) IDENTIFICATION OF UNSUCCESSFUL PROGRAMS.—Based upon program performance reports for each fiscal year submitted to the President under section 1116, the Director of the Office of Manage-

ment and Budget shall identify the civilian research and development program activities, or components thereof, which do not meet an acceptable level of success as defined in section 1115(b)(1)(B). Not later than 30 days after the submission of the reports under section 1116, the Director shall furnish a copy of a report listing the program activities or component identified under this subsection to the President and the Congress.

(b) ACCOUNTABILITY IF NO IMPROVEMENT SHOWN.—For each program activity or component that is identified by the Director under subsection (a) as being below the acceptable level of success for 2 fiscal years in a row, the head of the agency shall no later than 30 days after the Director submits the second report so identifying the program, submit to the appropriate congressional committees of jurisdiction:

(1) a concise statement of the steps necessary to—

(A) bring such program into compliance with performance goals; or

(B) terminate such program should compliance efforts fail; and

(2) any legislative changes needed to put the steps contained in such statement into effect.

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